Solving a System of Equations by Graphing

To solve a system of equations by graphing you need to *graph each line separately*. You will get one of the following answers:

- If the lines **intersect**, the solution is their **intersection point**

- If the lines are **parallel**, there is **no solution**

- If the lines are the **same line**, the answer is **all points on the line**
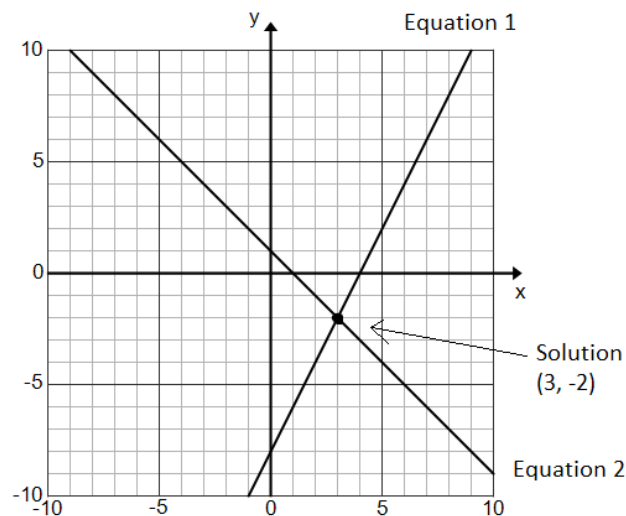
Example

Solve the following system by graphing: $\begin{cases} 2x - y = 8 \\ x + y = 1 \end{cases}$

Step 1: Graph the first equation. You might need to convert to slope-intercept form (solve for y)

$$2x - y = 8$$
$$\underline{-2x \qquad -2x}$$
$$\underline{-y = -2x + 8}$$
$$-1 \quad -1 \quad -1$$
$$y = 2x - 8 \;\; \rightarrow \textbf{Graph this equation}$$
$$\textbf{(Slope = 2, y-int = -8)}$$

Step 2: Graph the second equation. You might need to convert to slope-intercept form.

$$x + y = 1$$
$$\underline{-x \qquad -x}$$

$$y = -x + 1 \quad \rightarrow \textbf{Graph this equation}$$
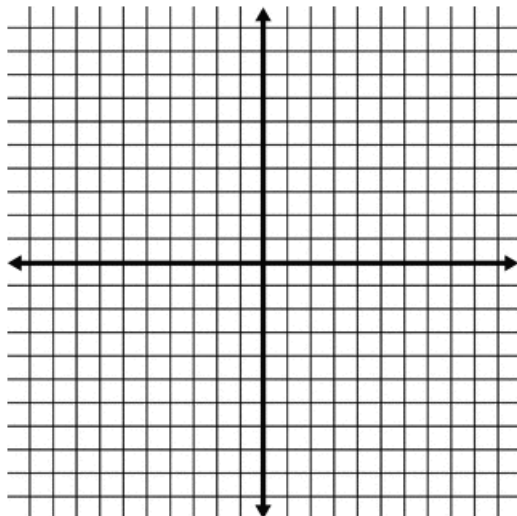$$\textbf{(Slope = -1, y-int = 1)}$$

Step 3: Find the solution. Since these lines intersect, the solution is the point where they intersect.
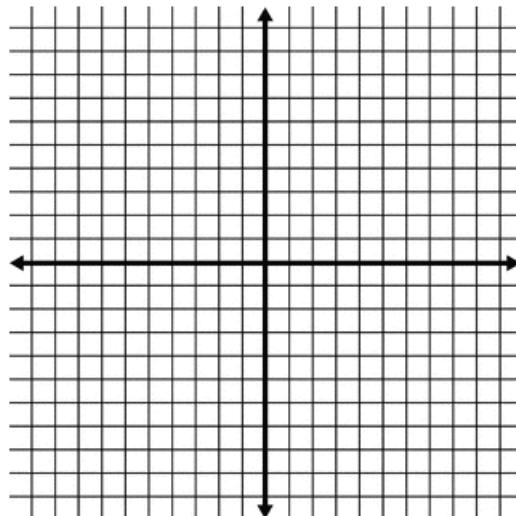
Solution: (3, -2)

Practice

Solve each system by graphing.
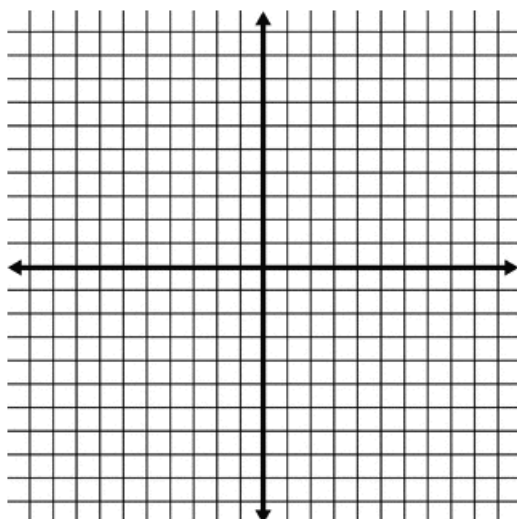
1.) $\begin{cases} y = -x + 1 \\ y = x - 3 \end{cases}$

2.) $\begin{cases} 3x + y = 4 \\ -3x + y = -2 \end{cases}$

Solution: _____
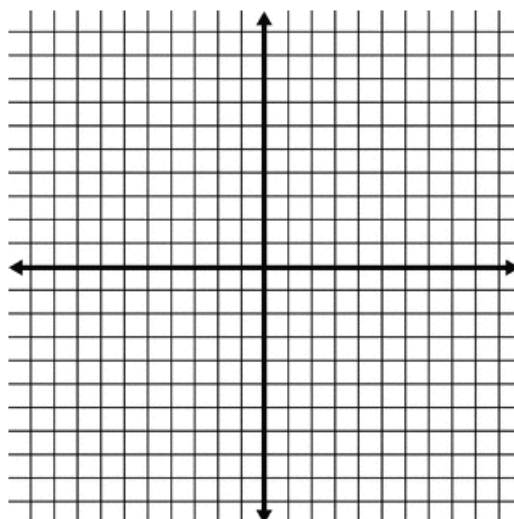
Solution: _____

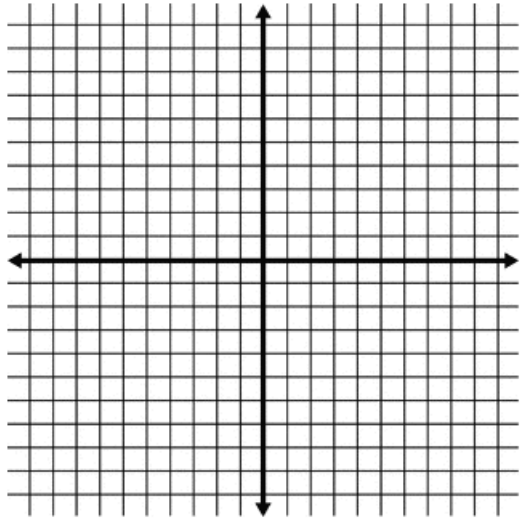3.) $\begin{cases} x + y = -2 \\ y = 2x + 7 \end{cases}$

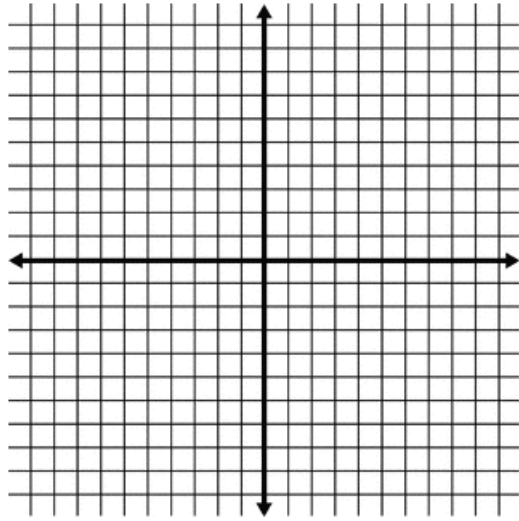4.) $\begin{cases} y = -3x + 1 \\ -4x + 2y = 2 \end{cases}$

Solution: _____

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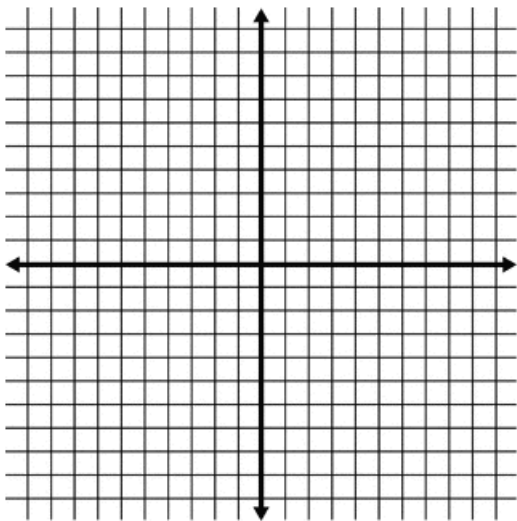
5.) $\begin{cases} y = -x - 3 \\ y = x - 1 \end{cases}$

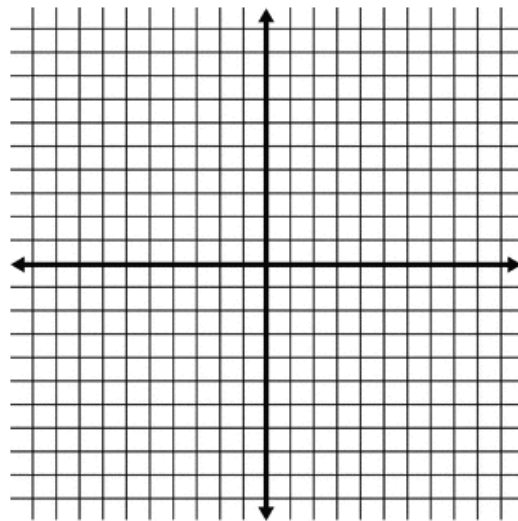6.) $\begin{cases} y = -2x + 3 \\ y = 3x + 3 \end{cases}$

Solution: _____

Solution: _____

7.) $\begin{cases} x = 2 \\ y = x + 1 \end{cases}$

8.) $\begin{cases} y = -2 \\ 2x - 2y = -4 \end{cases}$

Solution: _____

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